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Distortions to Global Agricultural Markets: What Next?

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Abstract

A decline in governmental distortions to agricultural and other trade since the 1980s has contributed to economic growth and poverty alleviation globally. But new modeling results suggest that has taken the world only three-fifths of the way towards freeing merchandise trade, and that farm policies are responsible for 70 percent of the global welfare cost of remaining distortions to goods markets as of 2004. Meanwhile, new drivers are affecting the mean and variance of world prices of farm products, including biofuel mandates and subsidies, climate change mitigation policies and adaptation, water institution and policy developments, difficulties in concluding a multilateral Doha Round agricultural agreement at the WTO, and policies relating to transgenic foods. This paper reviews trends and fluctuations in past distortions to agricultural incentives, speculates on how they might evolve in coming decades alongside other market developments, and draws out implications for Australia.

Keywords: Distorted incentives, agricultural and trade policy reforms, Asia-Pacific region

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Distortions to Global Agricultural Markets: What Next?

Agricultural protection and subsidies in high-income (and some middle-income) countries have been depressing international prices of farm products for many decades. This has been lowering the earnings of farmers and associated rural businesses in developing countries and food-exporting countries such as Australia and New Zealand, and may have added to global inequality and poverty because three-quarters of the world's poorest people depend directly or indirectly on agriculture for their main income. In addition to that external policy influence on rural poverty, however, the governments of many developing countries have directly taxed their farmers over much of the past half-century, have overvalued their currency, and have pursued an import-substituting industrialization strategy by restricting imports of manufactures (as was the case in Australia and New Zealand too up to the 1980s). Together those measures indirectly taxed producers of other tradable products in developing economies, by far the most numerous of them being farmers (Krueger, Schiff and Valdés 1988, 1991). As a result there has been over-production of farm products in high-income countries and under-production in more-needy developing countries. It also means there has been less international trade in farm products than would have been the case under free trade, thereby thinning markets for these weather-dependent products and thus making them more volatile. Using a stochastic model of world food markets, Tyers and Anderson (1992, Table 6.14) found that instability of international food prices in the 1980s was three times greater than it would have been under free trade in those products.

Numerous countries have begun to reform their agricultural price and trade policies during the past quarter century, however. To get a sense of how much that has reduced the

distortions to global markets for farm products, a recent World Bank research project examined policies affecting agricultural price incentives since 1955 in 75 countries that together account for more than 90 percent of the world's population and agricultural GDP (Anderson 2009). This paper first reviews those trends and fluctuations in past distortions to agricultural incentives before speculating on how they might evolve in coming decades alongside other key market developments. It begins with a summary of the methodology used to generate annual indicators of the extent of government interventions in markets. The indicators are then summarized across regions over the period since the mid-1950s. Results from a global economy-wide model provide quantification of the impacts on global agricultural trade and economic welfare of the reforms since the early 1980s and of the policies still in place as of 2004. New estimates of the impacts of 2004 policies on income inequality and poverty in developing countries are summarized as well, before discussing prospects for further reform. The paper concludes by drawing out implications for Australia and for areas of further research on agricultural trade.

Methodology for measuring the extent of price distortions

Government-imposed distortions can create a gap between domestic prices and what they would be under free markets. The Nominal Rate of Assistance (NRA) for each farm product was computed as part of the recent World Bank research project (see Anderson 2009) as the percentage by which government policies have raised gross returns to farmers above what they would be without the government's intervention (or lowered them, if NRA<0). A weighted average NRA for all covered products (an average of almost a dozen per country so as to cover more than two-thirds of the gross value of national farm production) was derived using the value of production at undistorted prices as weights (unlike the producer and

consumer support estimates (PSEs and CSEs) computed by OECD (2008), which are expressed as a percentage of the distorted price). To that NRA for covered products is added a 'guesstimate' of the NRA for non-covered products (on average around 30 percent of the total value of farm production) and an estimate of the NRA from non-product-specific forms of assistance or taxation.[1] Each farm industry is classified either as import-competing, or a producer of exportables, or as producing a nontradable (with its status sometimes changing over the years), so as to generate for each year the weighted average NRAs for the two different groups of covered tradable farm products.

Also computed is a production-weighted average NRA for nonagricultural tradables, for comparison with that for agricultural tradables via the calculation of a percentage Relative Rate of Assistance (RRA), defined as RRA = $100*[(100+NRAag^t)/(100+NRAnonag^t)-1]$ where $NRAag^t$ and $NRAnonag^t$ are the percentage NRAs for the tradables parts of the agricultural (including non-covered) and non-agricultural sectors, respectively.[2] Since the NRA cannot be less than -100 percent if producers are to earn anything, neither can the RRA (since the weighted average $NRAnonag^t$ is non-negative in all our country case studies). And if both of those sectors are equally assisted, the RRA is zero. This measure is useful in that if it is below (above) zero, it provides an internationally comparable indication of the extent to which a country's sectoral policy regime has an anti- (pro-)agricultural bias (Anderson et al. 2008).

The extent to which consumers are taxed or subsidized also is examined by the World Bank project. To do so, a Consumer Tax Equivalent (CTE) is calculated by comparing the

[1] Since the 1980s governments of some high-income countries have also provided so-called 'decoupled' assistance to farmers but, because that support in principle does not distort resource allocation, its NRA has been computed separately and is not included for direct comparison with the NRAs for other sectors or for developing countries.

[2] Farmers are affected not just by prices of their own products but also by the incentives nonagricultural producers face. That is, it is *relative* prices and hence *relative* rates of government assistance that affect producer incentives. More than seventy years ago Lerner (1936) provided his Symmetry Theorem that proved that in a two-sector economy, an import tax has the same effect as an export tax. This carries over to a model that also includes a third sector producing only nontradables (Vousden 1990).

price that consumers pay for their food and the international price of each food product at the border. Differences between the NRA and the CTE arise from distortions in the domestic economy that are caused by transfer policies and taxes/subsidies that cause the prices paid by consumers (adjusted to the farmgate level) to differ from those received by producers. In the absence of any other information, the CTE for each tradable farm product is assumed to be the same as the NRA from border distortions.

The cost of government policy distortions to incentives in terms of resource misallocation tends to be greater the greater the variation of NRAs across industries within the sector. A simple indicator of dispersion is the standard deviation of the covered industries' NRAs. However, it is helpful to have a single indicator of the overall welfare effect of each country's regime of agricultural price distortions in place at any time, and to trace its path over time and make cross-country comparisons. To that end, the family of indexes first developed by Anderson and Neary (2005) under the catch-all name of trade restrictiveness indexes has been drawn upon to generate indicators of distortions imposed by each country's agricultural policies on its economic welfare, and also on its agricultural trade. Lloyd, Croser and Anderson (2010) define and estimate a Welfare Reduction Index (WRI) and a Trade Reduction Index (TRI) for the same 75 countries, taking into account the fact that for some covered products the NRA and CTE differ. As their names suggest, these two new indexes respectively capture in a single indicator the direct welfare- or trade-reducing effects of distortions to consumer and producer prices of covered farm products from all agricultural and food price and trade policy measures in place. Specifically, the TRI (or WRI) is that ad valorem trade tax rate which, if applied uniformly to all farm commodities in a country that year would generate the same reduction in trade (or economic welfare) as the actual cross-commodity structure of agricultural NRAs and CTEs for that country, other things equal.

The WRI measure reflects the partial equilibrium welfare cost of agricultural price-distorting policies better than the NRA because it recognizes that the welfare cost of a government-imposed price distortion is related to the square of the price wedge. It thus captures the disproportionately higher welfare costs of peak levels of assistance or taxation, and is larger than the mean NRA/CTE and is positive regardless of whether the government's agricultural policy is favoring or hurting farmers. In this way the WRI and TRI go somewhat closer to what a computable general equilibrium (CGE) can provide in the way of estimates of the trade and welfare (and other) effects of the price distortions captured by the product NRA and CTE estimates – and they have the advantage over a CGE model of providing an annual time series.

Estimates of the changing extent of agricultural price distortions

A global summary of the new results from the World Bank project is provided in Figure 1. It confirms the concern expressed by D. Gale Johnson in his seminal book of 1973 that agricultural prices in developing countries were set well below international levels and that high-income countries were increasingly protecting their farmers. It also reveals that those patterns changed in the latter 1980s: after peaking at more than 50 per cent, the average NRA for high-income countries has fallen somewhat, depending on the extent to which one believes that some new farm programs are 'decoupled' in the sense of no longer influencing production decisions (see dashed line in Figure 1). For developing countries, by contrast, the average (negative) NRA for agriculture has been rising since the 1980s and, since the latter 1990s, has been slightly above zero.

The average NRA for developing countries conceals the fact that the exporting and import-competing subsectors of agriculture have very different NRAs. Figure 2 shows that

while the average NRA for exporters has been negative throughout (going from below −30 per cent prior to the latter 1980s to almost zero in 2000-04), the NRA for import-competing farmers in developing countries has been positive and fluctuating around a rising trend (spiking at 40 per cent in the mid-1980s period of low international prices). The anti-trade bias within agriculture (the effective taxing of both exports and imports of farm products) for developing countries has diminished since the mid-1980s, but the gap between the NRA averages of the import-competing and export subsectors is still around 20 percentage points.

The straight-line regressions in Figure 2 also reveals that the trend NRA for import-competing farmers in developing countries has increased at virtually the same pace as that in high-income countries. This suggests that growth in agricultural protection from import competition is something that begins at low levels of per capita income rather than being a phenomenon exclusive to high-income countries.

The improvement in farmers' incentives in developing countries is understated by the above NRA estimates, because those countries have also reduced their assistance to producers of non-agricultural tradable goods, most notably manufactures. The decline in the weighted average NRA for the latter, depicted as the upper line in Figure 3a, was greater than the increase in the average NRA for tradable agricultural sectors for the period to the mid-1980s but since the mid-1980s the changes in the NRAs of both sectors have contributed almost equally to the improvement in incentives to farmers. As a resulty, the relative rate of assistance (RRA) for developing countries as a group went from −46 per cent in the second half of the 1970s to 1 per cent in 2000-04. This increase (from a coefficient of 0.54 to 1.01) is equivalent to an almost doubling in the relative price of farm products, which is a huge change in the fortunes of developing country farmers from that depicted by Krueger, Schiff

and Valdés (1988, 1991) just two decades ago.[3] This is mostly because of the changes in Asia, but even for Latin America this relative price hike is one-half, while for Africa this indicator improves by only one-eighth. As for high-income countries, assistance to manufacturing was on average much less than assistance to farmers, even in the 1950s, and its decline since then has had only a minor impact on that group's average RRA (Figure 3b).[4]

It is the move from negative to positive RRAs for China and India that matter most for the world. Both countries have remained very close to self sufficient in agricultural products over the past four decades, and the steady rise in their RRAs has contributed to that outcome. It may also have helped ensure that the trend in China's ratio of urban to rural mean incomes (adjusted for cost of living differences) has been flat since 1980 (Ravallion and Chen 2007, Figure 3), and that the Gini coefficient for India hardly changed between 1984 and 2004 (World Bank 2008). A major question, addressed at the end of the paper, is: will those countries' RRAs remain at their current neutral level of close to zero, or will they continue to rise in the same way as observed in Korea and Taiwan and, before them, in Japan and Western Europe?

Turning to the single partial equilibrium indicators of the impact of agricultural distortions on national economic welfare and trade, the estimates by Lloyd, Croser and Anderson (2010) indicate that the trade-reducing impact of agricultural policies for developing countries as a group was roughly constant until the late 1980s and thereafter it declined, while for high-income countries the TRI first rose and then declined equally rapidly from the latter 1980s (Figure 4(a)). The TRI for developing countries is driven by the exportables subsector which was being taxed until recently and the import-competing subsector which was, and is increasingly, being protected (albeit less than in high-income

[3] See Anderson (2010a) for a direct comparison of their estimates with the most recent ones by the World Bank.
[4] Australia and New Zealand were clear exceptions, where manufacturing protection had been very high and its decline occurred several decades later than in other high-income countries (Anderson, Lloyd and MacLaren 2007).

countries – see Figure 2 above). For high-income countries, policies have supported both exporting and import-competing agricultural products and, even though they strongly favour the latter, the assistance to exporters has offset somewhat the anti-trade bias from the protection of those countries' import-competing producers.

The WRI estimates, shown in Figure 4(b), indicate a steady rise from the 1960s to the 1980s but some decline in the 1990s. This reflects the fact that NRAs for high-income and developing countries diverged (in opposite directions) away from zero in the first half of the period under study and then converged toward zero in the most recent quarter-century. The global weighted average NRA thus traces out a fairly flat trend whereas the global WRI traces out a hill-shaped path and thus provides a less misleading indicator of the trend in resource misallocation in world agricultural markets.

There is a great deal of NRA diversity also across commodities within each economy's farm sector, and the extent (as measured by the standard deviation) has not diminished over the past five decades. Hence the WRIs are generally much higher than the NRAs. This suggests there is still much that could be gained from improved resource reallocation both between economies and within the agricultural sector of individual economies, were differences in rates of assistance to be reduced.

To summarize, one of the most salient features of agricultural price and trade policies in the world since the 1950s is the growth in distortions in the first half of that period and the major economic reforms since. Overall levels of non-agricultural protection have declined considerably, which has improved the competitiveness of the agricultural sector in many developing economies – just as it has in Australia and New Zealand. Two other salient features in developing countries have been the gradual policy movement away from taxing agricultural exportables, but at the same time – and in contrast to non-agriculture – a rise in agricultural import protection. The latter means there is still scope for reducing distortions in

resource use within agriculture even in countries with an average NRA for agriculture and a RRA close to zero. In particular, an anti-trade bias in assistance rates within the farm sector remains in place. This may be understandable from a political economy viewpoint (see, e.g., Krueger 1990), but it nonetheless means that resources continue to be allocated inefficiently within the farm sector and, since openness tends to promote economic growth, that total factor productivity growth in developing country agriculture is slower than it would be if remaining interventions were removed.

Effects of past reforms and of remaining policies: results from economy-wide modelling

What have been the net economic effects of agricultural price and trade policy changes around the world since the early 1980s? And how do those effects on global markets, farm incomes and economic welfare compare with the effects of policy distortions that were still in place as of 2004? Valenzuela, van der Mensbrugghe and Anderson (2009) use a global economy-wide model known as Linkage (van der Mensbrugghe 2005) to provide a combined retrospective and prospective analysis that sought to assess how far the world had come, and how far it still has to go, in rectifying the disarray in world agriculture. It quantifies the impacts both of past reforms and of current policies by comparing the effects of the recent World Bank project's distortion estimates for the period 1980-84 with those of 2004.

Several key findings from that economy-wide modelling study are worth emphasizing. First, the policy reforms from the early 1980s to the mid-2000s is estimated to have improved global economic welfare by $233 billion per year, and removing the distortions remaining as of 2004 would add another $168 billion per year. This suggests that in a global welfare sense the world moved three-fifths of the way towards global free trade in goods over that quarter century. That finding from a general equilibrium model is similar in

magnitude to the extent of the decline in the partial equilibrium Welfare Reduction Index shown in Figure 4b.

Second, developing countries benefited proportionately more than high-income economies (1.0 percent compared with 0.7 percent of national income) from those past policy reforms, and would gain nearly twice as much as high-income countries by completing that reform process (an average increase of 0.9 percent compared with 0.5 percent for high-income countries). Of those prospective welfare gains from global liberalization, 70 percent would come from agriculture and food policy reform. This is a striking result given that the shares of agriculture and food in global GDP and global merchandise trade are only 3 and 6 percent, respectively. The contribution of farm and food policy reform to the prospective welfare gain for just developing countries is even slightly greater, at 72 percent.

Third, the share of global farm production exported (excluding intra-European Union (EU) trade) in 2004 has been slightly smaller as a result of those reforms since 1980-84, because of less farm export subsidies: the 8 per cent share for agriculture in 2004 contrasts with the 31 per cent share for other primary products and the 25 per cent for all other goods. If the policies distorting goods trade in 2004 were removed, the share of global production of farm products that is exported would rise from 8 to 13 per cent, thereby reducing instability of international prices and the quantities of those products traded.

Fourth, the developing countries' share of the world's primary agricultural exports rose from 43 to 55 percent, and its farm output share from 58 to 62 percent, because of those reforms, with rises in nearly all agricultural industries except rice and sugar. Removing remaining goods market distortions would boost their export and output shares to 64 and 65 percent, respectively.

Fifth, for developing countries as a group, net farm income (value added in agriculture) is estimated to be 4.9 percent higher than it would have been without the reforms

of the past quarter century, which is more than ten times the proportional gain for non-agriculture. If policies remaining in 2004 were removed, net farm incomes in developing countries would rise a further 5.6 percent, compared with just 1.9 percent for non-agricultural value added. As well, returns to unskilled workers in developing countries – the majority of whom work on farms – would rise more than returns to other productive factors from that liberalization. The impact on sectoral incomes would be even starker in Australia, where agricultural GDP would rise 13 percent compared with only 2 percent for non-agricultural GDP. This would help most rural regions of Australia, thereby offsetting the adverse impact on them of Australia's on-going mining boom (Anderson, Geisecke and Valenzuela 2010).

Together, these findings suggest that international inequality and global poverty could be alleviated by further farm policy reform, given that three-quarters of the world's poor are farmers in developing countries. To examine that issue more carefully, the World Bank research project undertook some economy-wide studies using global and national models with detailed household information (Anderson, Cockburn and Martin 2010a,b). In doing so, careful consideration was given to impacts on household income and expenditure. The fact that the poorest households in the poorest countries are concentrated in agriculture means those households are likely to benefit from farm producer price increases engendered by trade policy reform, other things equal. However, the outcome is not certain because poor households also spend the majority of their income on staple foods (Cranfield *et al.* 2003), so if food prices rise as a consequence of reform then this adverse effect on household expenditure may more than offset any beneficial effect of higher earnings. Also, the urban poor would be adversely affected by a rise in consumer prices of staple food, which may be more or less than offset by any induced rise in the demand for their unskilled labor.

The approach adopted in the Anderson, Cockburn and Martin (2010a) study to operationalize the above theory is a variant on the path-breaking approach pioneered by

Hertel and Winters (2005, 2006) in their study of the poverty consequences of a prospective Doha round agreement under the WTO. The new country case studies examine full unilateral reforms that individual developing countries might implement, the effects of which are compared with what full liberalization abroad would generate, so as to be able to assess the relative importance domestically for each nation of own-country policies as distinct from those of other countries. The national CGE models are able on their own to estimate the effects of unilateral reform of agricultural or all merchandise trade-distorting policies. The World Bank's global Linkage model was chosen to provide the national modelers with estimates of the effects of other countries' policies (amended to incorporate above estimates of agricultural distortions).

As found in previous studies, whether based on *ex post* econometrics (as in Harrison 2007) or *ex ante* economy-wide simulation (as in Hertel and Winters 2006), the results are mixed and so not easy to summarize, particularly with regard to the poverty effects. There is nonetheless a high degree of similarity in the most important sign: the extreme poverty alleviating effect of freeing all merchandise trade globally. Furthermore, this beneficial impact of full liberalization of global merchandise trade on the world's poor would come more from agricultural than non-agricultural policy reform; and, within agriculture, more from the removal of substantial support provided to farmers in high-income countries than from developing country policy reform. Such reform would raise real earnings of unskilled workers in developing countries, most of whom work in agriculture. Their earnings would rise relative to both unskilled workers in developed countries and to other income earners in developing countries. This would thus reduce inequality both within developing countries and between developing and high-income countries, in addition to reducing poverty. Full trade liberalization of all goods, or just of agricultural products, also would cause inequality to decline within each of the three developing country regions covered by that sample of

countries, and both for own-country and rest-of-world reform. Inequality within the rural or urban household groupings would not alter much following full trade reform, suggesting that trade reform's predominant distributional impact would be to reduce urban-rural inequality.

What next?

The prospects for further policy reform will be conditioned in part on developments in markets for farm and other products. On the demand side, the projected uneven growth in national populations and per capita incomes for coming decades is likely to be in relatively low-income countries including China and India. This implies significant changes to the economic centres of gravity of food and livestock feed consumption in the global economy, given that price and income elasticities of demand for food tend to decline with per capita income and earlier for lower-valued foods such as staple grains and tubers than for livestock and horticultural products. On its own this change is likely to put upward pressure on international prices of farm products.

Another important development on the demand side has to do with the new linkage between markets for fossil fuels and biofuel sources of energy. The rising user price of fossil fuels from 2003, together with concerns about the effect of burning such fuels on climate change, led the US and EU governments to provide user subsidies and to mandate a certain degree of use of biofuels. With those policies in place, it has become privately profitable for such products as corn, sugar and oilseeds to be used as inputs into ethanol or biodiesel – and for food and energy raw material prices to move together much more than in the past 9see Figure 5). If the user price of crude petroleum (including the price of carbon emissions) remains at historically high levels as is assumed by the International Energy Agency (2009) and is forecast by the World Bank (2010), that new source of demand for crop products will

possibly continue, adding to the upward pressure on their prices.[5] And to the extent biofuel mandates are inflexible, they could add to the volatility of international prices of food because that component of demand will not be price-responsive.

On the supply side of the market for farm products, there is the possibility of technological catch-up by lagging regions through faster generation and importation of modern farm technologies, for example via the Green Revolution for Africa initiative of the Gates and Rockefeller Foundations. The new agricultural biotechnology revolution can contribute to that if government regulations and consumer sentiment allow, including through partnerships between public sector researchers and private life science firms. Policies towards transgenic crops have already caused major transformations of much of the cropping in North and South America; and biotech food crop policy reforms that began in China in 2010 (allowing field experiments in Bt rice) may soon spread to other crops and other developing countries. Such reforms are likely to be necessary, though, to reduce the prospect of global crop yields falling in the wake of the slowdown in agricultural R&D over the past two decades and the diversion of more of the remaining funds towards conserving natural resources and the environment (Alston, Beddow and Pardey 2009).

Also affecting supply trends is climate change. Its effects on aggregate global agricultural production and its location across countries and regions without and with mitigation and adaptation are great unknowns, not least because there are many possible government policy responses unilaterally and multilaterally. Moreover, the uncertainties about what policy instruments will be adopted by whom and when will be spread over decades rather than just the next few years. Land use undoubtedly will be affected non-trivially; carbon credits and emissions trading will have unknown and possibly major effects

[5] The cost of fuel and fertilizer needed to produce crops will rise with petroleum prices as well though, making biofuels less competitive than otherwise. Also, biofuels probably have a higher carbon footprint than most other renewable energy sources, and so over time governments may be dissuaded from continuing with biofuel subsidies and mandates as a route to reducing dfependence on imported fossil fuels.

depending among other things on whether/how/when agriculture and forestry are included in the schemes of various countries, as will any border tax adjustments or other sanctions imposed on imports from countries deemed to be not sharing the burden of reducing greenhouse gases; crop yield fluctuations will be greater because of weather volatility and especially more extreme weather events, leading to further triggers for trade policy interventions aimed at stabilizing domestic food markets; and so on. The literature on these and myriad other ways in which agricultural markets are expected to be affected directly and indirectly by climate change and associated policy and technological responses is growing exponentially. One of the more widely cited is by Cline (2007), who predicts that by the 2080s, even with carbon fertilization, agricultural output will be 8 percent lower in developing countries, 8 percent higher in high-income countries, and 3 percent lower globally. Projections in a more recent study by IFPRI, assuming no carbon fertilization, suggest that by 2050 climate change will have had only a little downward impact on coarse grain production but will have reduced global rice production by one-eighth and wheat by one-quarter globally and nearly one-third in developing countries (Nelson et al. 2009).

True, climate mitigation policies could have an adverse effect on industrialization in the more advanced developing countries such as China and lead to their agricultural sector in aggregate benefitting indirectly (Mattoo et al. 2009), but the consensus nonetheless seems to be that expected climate change over the coming decades and its impact on water availability and demand will add to the difficulty of growth in global supplies of farm products outstripping growth in demand this century, in contrast to the 20th century. The World Bank (2010), for example, forecasts that its index of real international agricultural prices in 2020 will be about 50 percent above its level in 2000; and Nelson et al. (2009, Table 2) expect real international prices of grain and livestock in 2050 would be between 35 and 70 percent higher than in 2000 without climate change and more than 10 percentage points higher again

with climate change even with carbon fertilization. Bearing in mind that the food price index in 2009 was about 70 percent above its 2000 level (Figure 5), those projections suggest climate change could be enough to prevent real food prices from falling over the next four decades.

Bearing in mind the above expected developments in markets for farm products, how might agricultural price-distorting policies evolve over the coming decades? If the reform processes of the past quarter century continue, such that national RRAs converge towards zero (from below by most developing countries and from above by higher-income countries), there would continue to be a re-location of global farm production (in global share terms) from high-income to developing countries, reversing the policy distortion-driven opposite trend in the quarter century prior to the mid-1980s. Whether that would tend to push international food prices up or down depends on the relative size of the two groups of countries and which had the larger RRA change (bearing in mind that some export restrictions still remain, including in Argentina). According to the global CGE modeling exercise outlined in the previous section, if all goods market distortions as of 2004 were removed globally the net change in international prices would be very small – but, international markets would be 'thicker' because of such reform so their volatility from year to year would be less than otherwise, boosting global food security.

Such a policy scenario would imply that the early 1960s to the mid-1980s was an aberrant period of welfare-reducing policy divergence (negative and very low RRAs in newly independent developing countries, positive and rising RRAs in most high-income countries) that has given way to growth-enhancing, welfare-improving and inequality- and poverty-reducing reforms. In this view the reforms could be seen as the result of learning from the differing growth experiences of more- and less-open economies, and appreciating that with

the increased variability of seasonal conditions due to climate change it is wiser for economies to be more open.

An alternative interpretation of history is that it is the most recent 25-year period of RRA changes that is aberrant. The RRA declines in high-income countries, according to this alternative view, are associated more with, in the case of the EU, its 1992 Single Market initiative and subsequent EU enlargements than with external reform pressure from other World Trade Organization (WTO) members,[6] and with the fact that the high protection rates of the mid-1980s represent a temporary spike above trend caused by the very low international commodity prices then, and conversely for the low rates in 2007-08 reported by the OECD. As for the rise of developing country RRAs in this alternative view, that simply follows the example provided earlier by higher-income countries and will not stop when those RRAs reach zero. Inspection of the NRAs in Figure 2a for exporting and import-competing sub-sectors of developing country agriculture reveals that the convergence of their aggregate NRAs to near zero is mainly with respect to the exporting sub-sector. NRAs for import-competing farmers in developing countries, by contrast, are positive and (if one ignores the latter 1980s when international food prices spiked downwards) are trending upwards over time.

Moreover, in developing countries there are few signs of a slowdown of the upward trend in agricultural protection from import competition over the time period studied.[7] On the contrary, there are numerous signs that developing country governments want to keep open their options to raise agricultural NRAs in the future, particularly via import restrictions. One indicator is the high tariff bindings developing countries committed themselves to following

[6] See Swinnen (2008). As explained by Josling (2009), the budgetary cost of continuing with the EU's past levels of support would have sky-rocketed following the EU membership expansion eastwards, with little if any of those extra payments going to the traditional lobbyists for the CAP.

[7] True, applied tariffs were lowered or suspended as a way of dealing with the international food price spike in 2008, but initial indications are that this, and the food export taxes or quantitative restrictions imposed that year by numerous food-exporting developing countries, lasted only until international prices returned close to their trend levels in 2009 (as happened after the price hike of 1973-74 and the price dip of 1986-87).

the Uruguay Round: as of 2001, actual applied tariffs on agricultural products averaged less than half the corresponding bound tariffs for developing countries of 48 percent, and less than one-sixth in the case of least-developed countries (Anderson and Martin 2006, table 1.2). Another indicator of agricultural trade reform reluctance is the unwillingness of many developing countries to agree to major cuts in bound agricultural tariffs in the WTO's on-going Doha Round of multilateral trade negotiations. More than that, the current negotiations have brought to prominence a new proposal for agricultural protectionism in developing countries. This is based on the notion that agricultural protection is helpful and needed for food security, livelihood security and rural development. This view has succeeded in bringing "Special Products" and a "Special Safeguard Mechanism" into the multilateral trading system's agricultural negotiations, despite the fact that such policies, which would raise domestic food prices in developing countries, may worsen poverty and the food security of the poor (Ivanic and Martin 2008).

These two alternative interpretations of history have profoundly different implications for the future. The first suggests that the WTO's Doha Round of multilateral trade negotiations is likely to conclude with substantial cuts to agricultural tariff and subsidy bindings that lock in recent reforms and go close to relegating protectionism in agricultural markets to history. In that case world food price trends would simply depend on whether improvements in farm versus nonfarm technologies could keep pace with the growth in global demand for farm products. That was certainly possible in the 20th century (see Pfaffenzeller, Newbolt and Rayner 2007) but, given the pace of climate change and the recent growth in demand for biofuels, it may be more of a challenge in the 21st century especially if much of the world continues to shun genetically modified food. In particular, the emerging economies of China and India would become more food import-dependent as they continue

to rapidly industrialize, should their RRAs cease rising and instead stay at their present near-zero levels.

The other interpretation of history – one that views as normal a movement from taxing to subsidizing farmers as an economy develops – suggests the Doha Round will struggle to reach an ambitious reform outcome in agriculture, and that developing countries will make use of the legal wiggle room they have allowed themselves in their WTO bindings to follow Japan, Korea and Taiwan into higher levels of agricultural protection. In that case international food prices would rise less than in the first scenario, but domestic food prices in developing countries, particularly for importables, would rise relative to international prices. If this is the more realistic interpretation of history, it places much more weight on the role of the economics profession in contuning to expound the virtues of governments keeping out of markets that would otherwise function well, and limit themselves to overcoming market failures, such as the under-investment in agricultural R&D, improving institutions such as those needed to improve water property rights, offsetting externalities, and raising government revenue efficiently (e.g. via value added taxation) to finance social programs that attract broad-based support (e.g. to reduce rural-urban inequality and poverty and thereby alleviate social unrest). Available evidence suggests that problems of rural-urban poverty gaps have been partly alleviated in parts of Asia and Africa by some of the more-mobile members of farm households finding full- or part-time work off the farm and repatriating part of their higher earnings back to those remaining in farm households (Otsuka and Yamano 2006, Otsuka, Estudillo and Sawada 2009). Efficient ways of assisting any left-behind groups of poor (nonfarm as well as farm) households include reducing any underinvestment in rural

public goods that have high social payoffs such as basic education and health and rural infrastructure, as well as agricultural research.[8]

Implications for Australia

As a net exporter of many farm products, Australia would do relatively well from a freeing of remaining distortions to agricultural incentives globally. According to the global modeling results in Valenzuela, van der Mensbrugghe and Anderson (2009), its real GDP would rise at least as much as for other high-income countries from such liberalization (while New Zealand's would be boosted far more per capita, because of it stronger export specialization in farm products). When the terms of trade improvement responsible for that income boost are imposed on a detailed regional model of the Australian economy, that national model reveals that most rural regions of Australia would benefit – but at the expense of the mining-intensive regions (Anderson, Giesecke and Valenzuela 2010). Such a reform to world goods markets thus would offset the adverse effect on rural regions of (a) the on-going mining boom that has strengthened the Australian dollar so markedly over the past few years and (b) the expected adverse effect on Australian farm productivity from climate change over coming decades.[9] Keeping the pressure on WTO members to bring the Doha Round of trade negotiations to a successful (that is, trade-liberalizing) conclusion should therefore continue to be a high priority for Australia.

[8] Data in Pardey et al. (2006) suggest that public R&D expenditure in Asia since the late 1970s has averaged less than 0.5 percent of the gross value of production at undistorted prices, which is trivial compared with the NRA via price-distorting measures for Asia. Even if just one-twentieth of the current NRA provided to Asian farmers via farm price-support policies was replaced by agricultural R&D expenditure, that would more than double current public spending on such R&D – and the latter would increase regional economic welfare and the welfare of net buyers of food whereas price-raising policies reduce both. Such a boost to Asian R&D could well be able to generate another green revolution of the order of magnitude of the first one that began in the 1960s, especially if it took full advantage of the new developments in biotechnology (as shown for rice, for example, in Anderson, Jackson and Nielsen 2005).

[9] Gunasekera et al. (2008), for example, expect that, in the absense of mitigation and adaptation and ignoring terms of trade changes, agricultural output in Australia by 2050 would be nearly one-eighth lower than in 2006.

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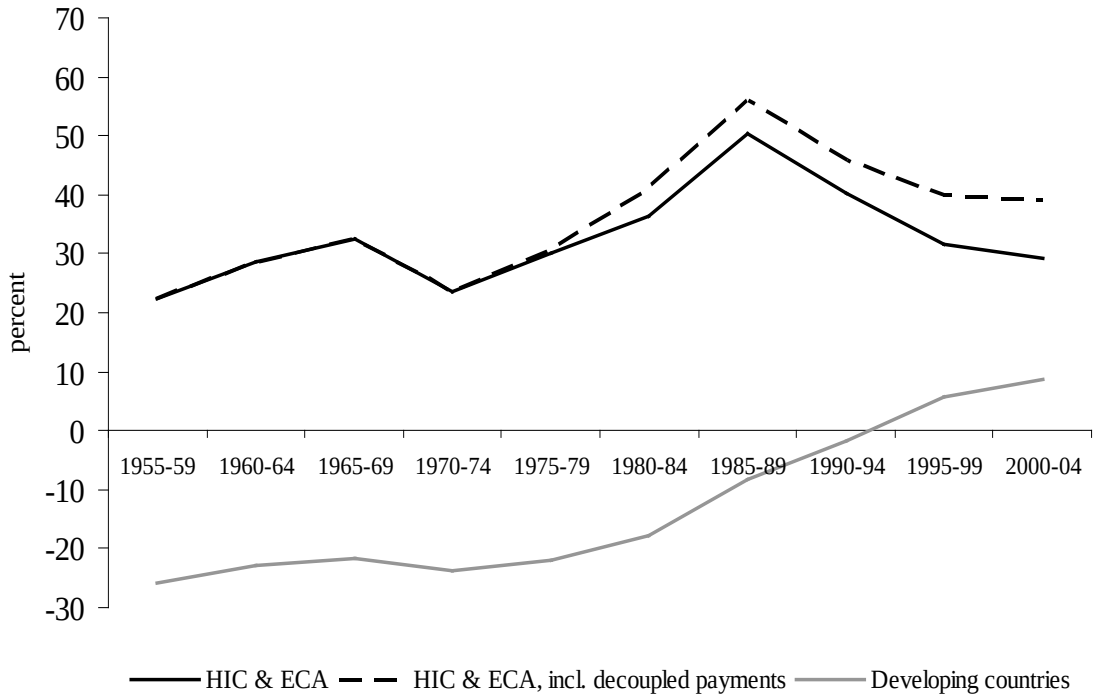
Figure 1: Nominal rates of assistance to agriculture in high-income, transition[a] and developing countries, 1955 to 2004

(per cent, weighted averages, with 'decoupled' payments included in the dashed line)



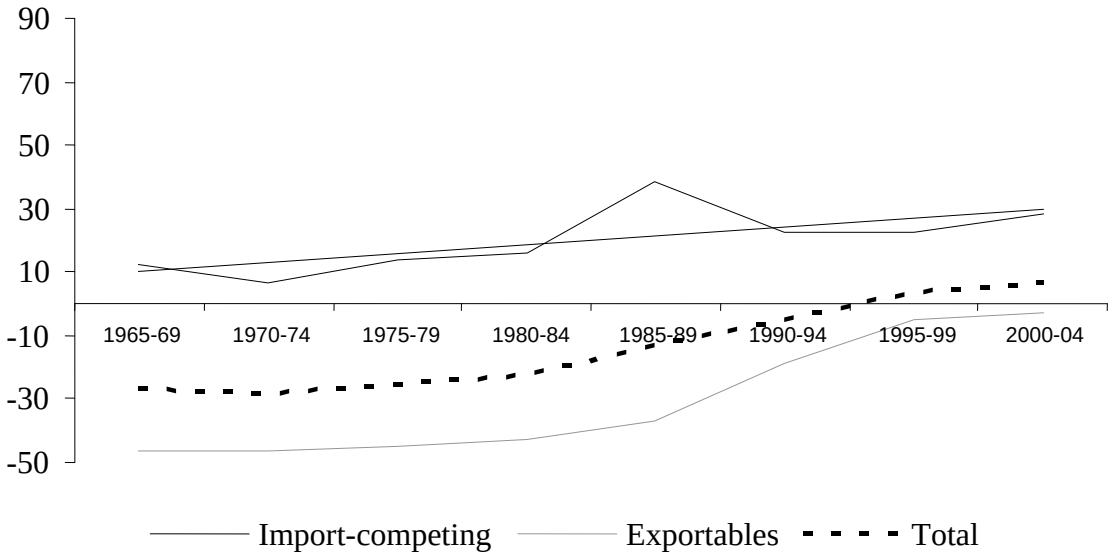
[a] Denoted by the World Bank as ECA, for (Central and Eastern) Europe and Central Asia.

Source: Anderson (2009, Ch. 1), based on estimates in Anderson and Valenzuela (2008).

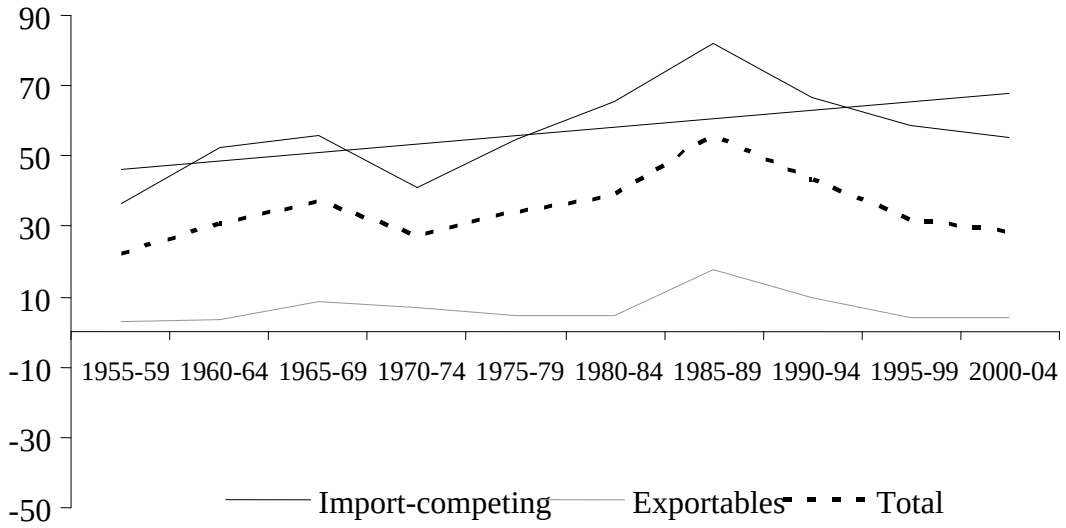
Figure 2: Nominal rates of assistance to exportable, import-competing and all covered agricultural products,[a] high-income, transition and developing countries, 1955 to 2004

(per cent)

(a) Developing countries



(b) High-income countries plus Europe's transition economies

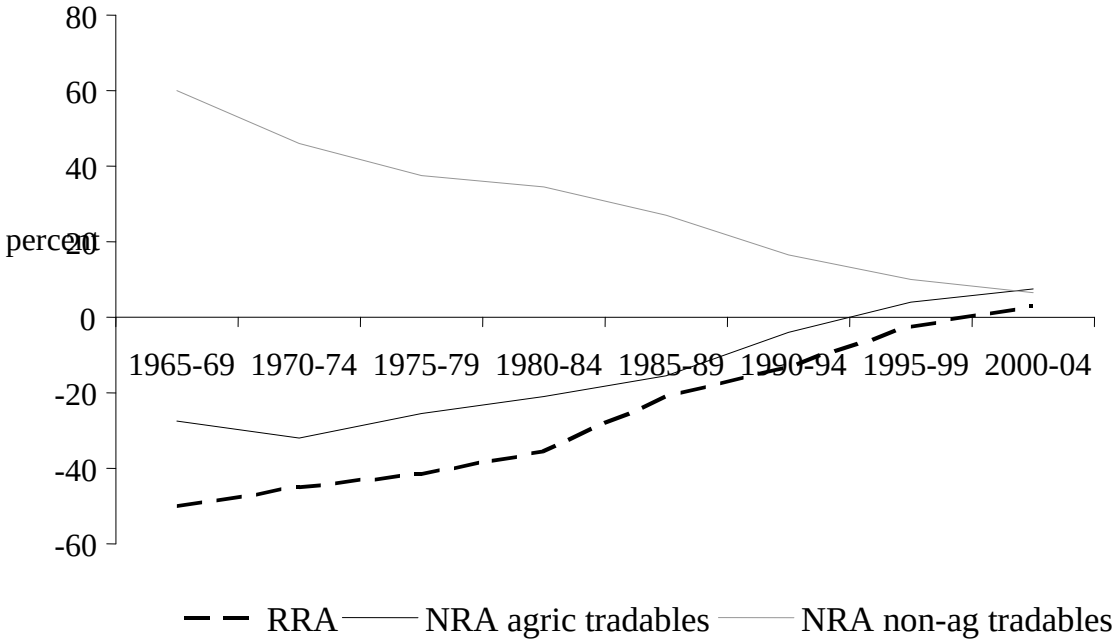


[a]Covered products only. The total also includes nontradables. The straight line in the upper segment of each graph is from an ordinary-least-squares regression based on annual NRA estimates.

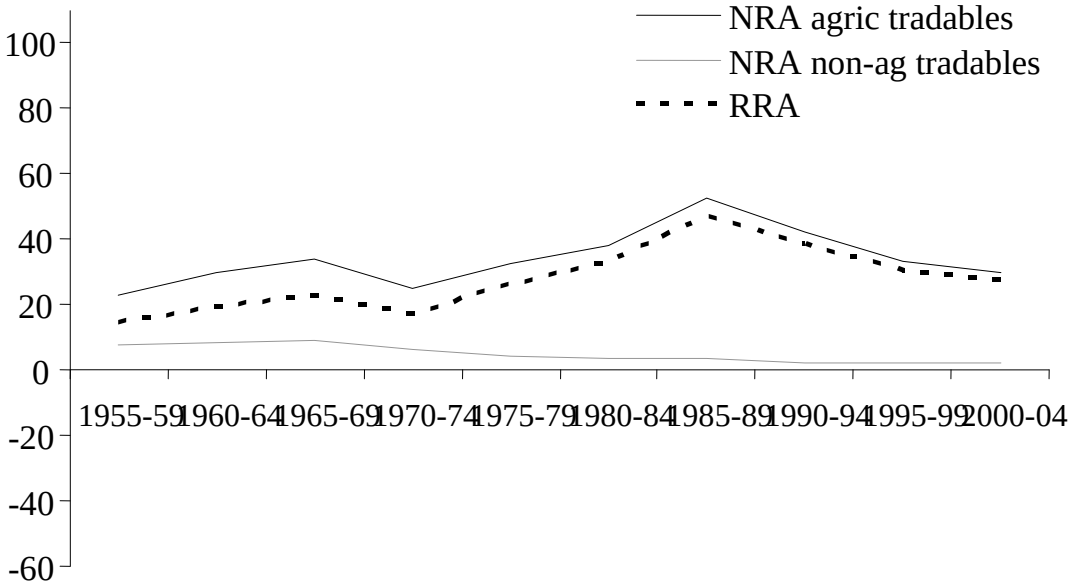
Source: Anderson (2009, Ch. 1), based on estimates in Anderson and Valenzuela (2008).

Figure 3: Nominal rates of assistance to agricultural and non-agricultural tradable sectors and relative rate of assistance,[a] developing and high-income countries, 1955 to 2004
(per cent, farm production-weighted averages across countries)

(a) Developing countries



(b) High-income countries



[a] The RRA is defined as $100*[(100+NRAag^t)/(100+NRAnonag^t)-1]$, where $NRAag^t$ and $NRAnonag^t$ are the percentage NRAs for the tradables parts of the agricultural and non-agricultural sectors, respectively.

Source: Anderson (2009, Ch. 1), based on estimates in Anderson and Valenzuela (2008).

Figure 4: Trade and welfare reduction indexes for tradable farm products, by region, 1960 to 2007

(percent)

(a) Trade reduction index

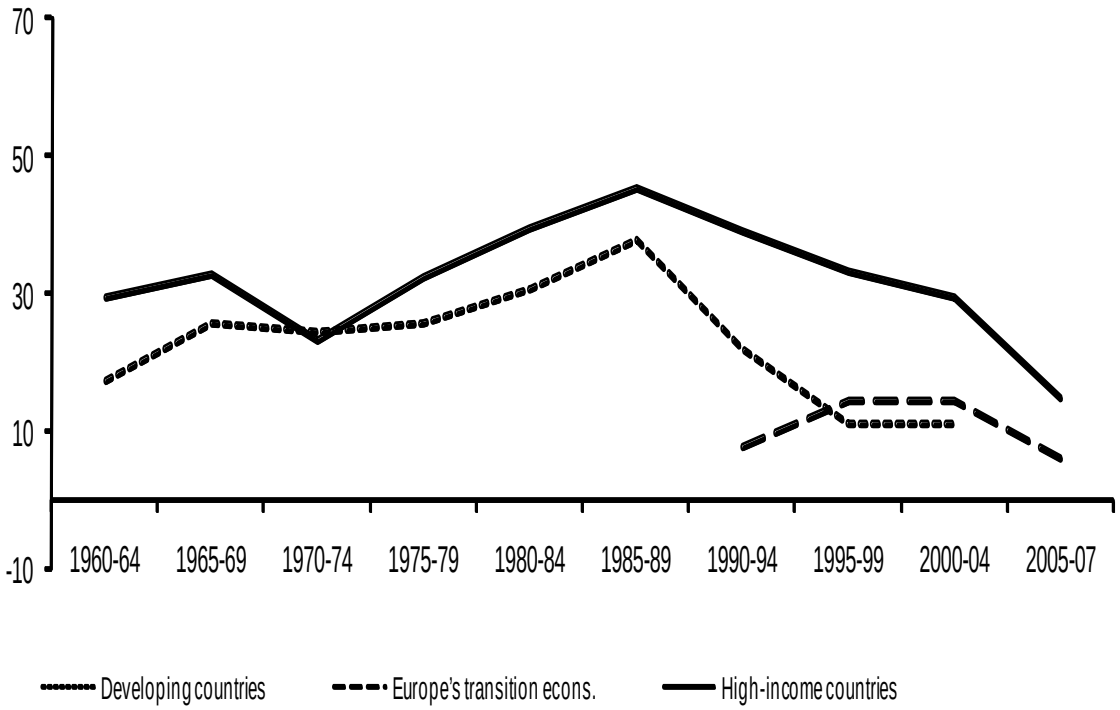
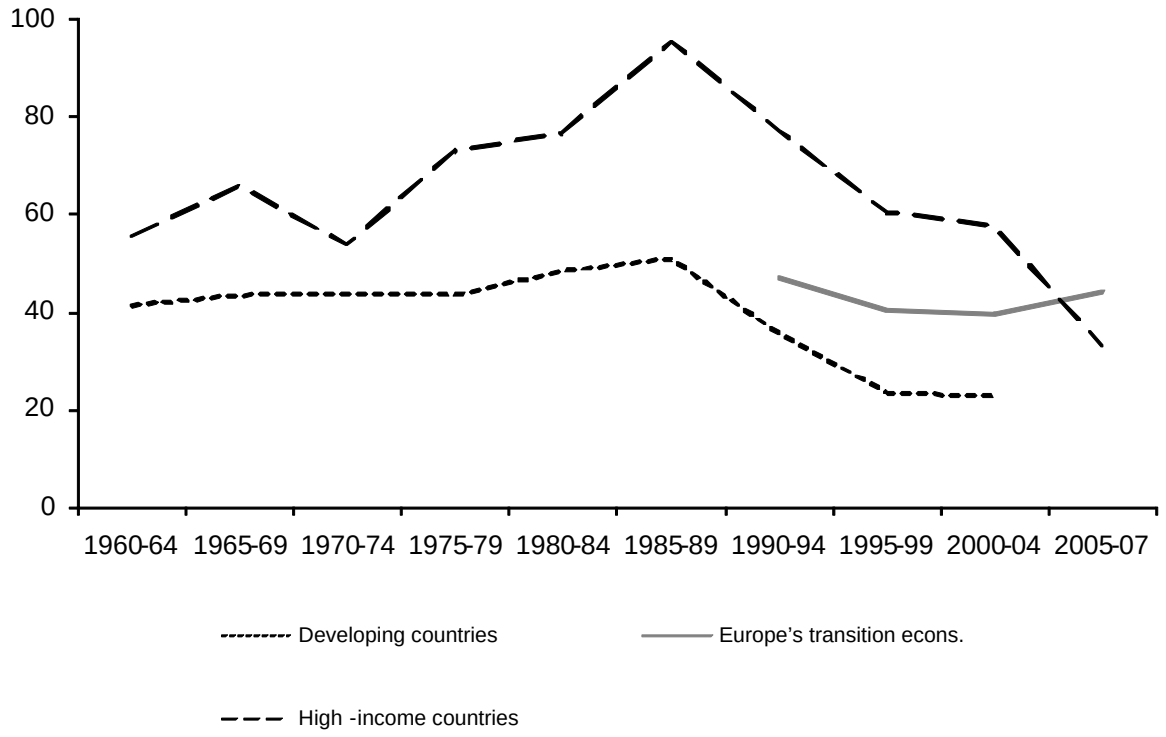


Figure 4 (continued): Trade and welfare reduction indexes for tradable farm products, by region, 1960 to 2007

(percent)

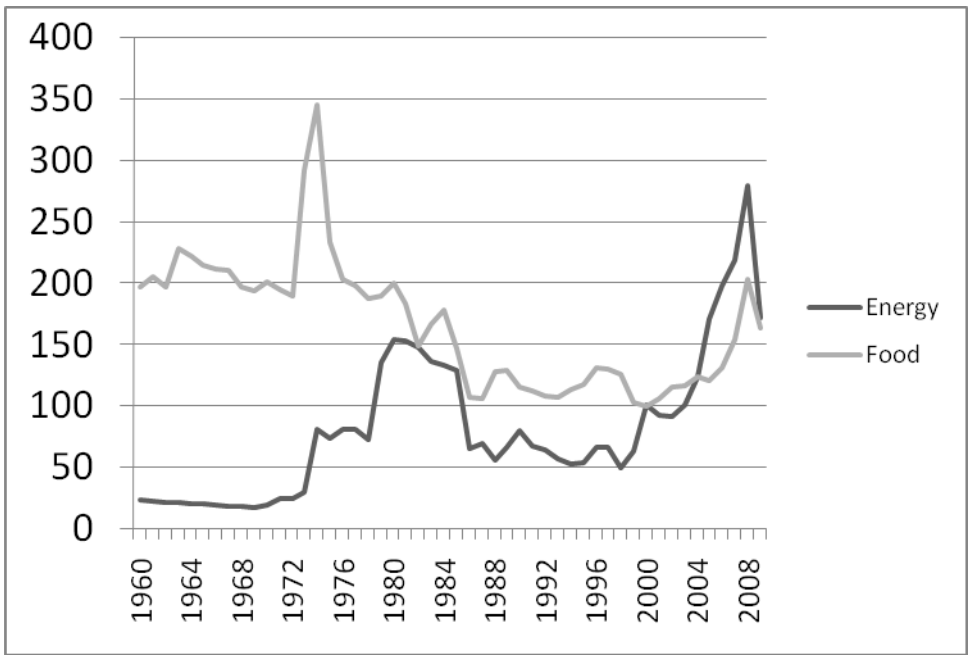
(b) Welfare Reduction Index



Source: Lloyd, Croser and Anderson (2009), based on NRAs and CTEs in Anderson and Valenzuela (2008).

Figure 5: International price indexes for food and fossil fuel energy raw materials

(2000 = 100)



Source; World Bank (2010).